CLAIMS

What is claimed is:

1. A shock absorber piston assembly, comprising:

a piston having a first face and an opposed second face and a plurality of fluid passages allowing fluid communication between the first face and the second face; and

a plurality of flow control devices each operably sealing at least one of the fluid passages, including:

at least a pair of bleed plates, including a first bleed plate operably contacting the first face and a second bleed plate operably contacting the second face; and

at least a pair of blow-off discs, including a first blow-off disc operably contacting the first face and a second blow-off disc operably contacting the second face;

wherein each of the flow control devices operably opens at an individually adjustable device opening pressure.

2. The piston assembly of Claim 1, comprising a compression device operably maintaining each of the flow control devices in a closed position in contact with the piston until each of the flow control devices operably opens at the individually adjustable device opening pressure.

3. The piston assembly of Claim 2, comprising a piston rod engageably disposed through the piston.

4. The piston assembly of Claim 3, wherein the compression device comprises a spring operably maintaining contact between each of the bleed plates and the piston.

5. The piston assembly of Claim 4, wherein the spring comprises:

a spring engagement end fixedly engaged with a slot of the piston rod; and

a spring force distribution end in contact with the bleed plate.

6. The piston assembly of Claim 3, wherein the compression device comprises at least one spring disc plate operably maintaining contact between each of the blow-off discs and the piston.

7. The piston assembly of Claim 6, comprising a preload spacer connectably affixed to the piston rod and operably preloading the at least one spring disc plate.

8. The piston assembly of Claim 7, comprising an interface disc located between the at least one spring disc plate and each of the blow-off discs.

9. A shock absorber fluid flow control assembly, comprising:

a piston having a first face and an opposed second face;

a pair of fluid passage sets formed through the piston, a first one of the fluid passage sets isolable at the first face and a second one of the fluid passage sets isolable at the second face;

a plurality of passages in each fluid passage set each having a passage flow area selected from a different one of a plurality of passage flow areas; and

a pair of blow-off discs each operably sealing one of the fluid passage sets, including a first blow-off disc in displaceable contact with the first face and a second blow-off disc in displaceable contact with the second face;

wherein a fluid pressure acting on one of the first face and the second face operably acts through one of the fluid passage sets to initially angularly displace and subsequently to fully open one of the pair of blow-off discs.

10. The control assembly of Claim 9, comprising at least two bleed passages formable through the piston, including at least a first bleed passage isolable at the first face and a second bleed passage isolable at the second face.

11. The control assembly of Claim 10, comprising a pair of bleed plates including a first bleed plate operably contacting the first face and a second bleed plate operably contacting the second face.

12. The control assembly of Claim 11, comprising:

at least one spring disc operably preloading each blow-off disc; and

at least one spring operably preloading each bleed plate.

13. The control assembly of Claim 12, comprising a predetermined quantity of the spring discs operably forming an adjustable blow-off disc opening pressure.

14. The control assembly of Claim 12, comprising a predetermined thickness of each of the spring discs operably forming an adjustable blow-off disc opening pressure.

15. The control assembly of Claim 9, comprising a raised land operably forming a sealable end of each passage.

16. The control assembly of Claim 10, wherein each passage of each passage set is located adjacent to an outer diameter of the piston.

17. The control assembly of Claim 10, wherein each bleed passage is located interior to each passage of each passage set.

18. A shock absorber, comprising:

a piston tube;

a piston assembly slidably disposed within the piston tube and operably dividing the piston tube into a first working chamber and a second working chamber, the piston assembly including:

(i) a piston having a first face and an opposed second face and a plurality of fluid passages allowing fluid communication between the first face and the second face; and

(ii) a plurality of flow control devices each operably sealing at least one of the fluid passages, including:

(a) at least a pair of bleed plates, including a first bleed plate operably contacting the first face and a second bleed plate operably contacting the second face; and

(b) at least a pair of blow-off discs, including a first blow-off disc operably contacting the first face and a second blow-off disc operably contacting the second face; and

a piston rod fastenably attached to the piston assembly.

19. The shock absorber of Claim 18, wherein the piston rod comprises a first end fitting connectable to an axle assembly of an automobile vehicle.

20. The shock absorber of Claim 19, comprising:

a tubular end slidably disposed over both the piston tube and a freely extending end of the piston rod; and

a second end fitting fixedly connectable to the freely extending end of the piston rod and operably connecting the shock absorber to a vehicle body of an automobile vehicle.

21. A method to control fluid flow across a piston assembly of a shock absorber, the piston assembly having a first face and an opposed second face and a plurality of fluid passages, the method comprising:

orienting a piston in a piston tube to allow fluid communication between the first face and the second face;

sealing each of the fluid passages on each of the first face and the second face with a flow control device selected from a pair of bleed plates and a pair of blow-off discs; and

preloading an opening pressure for each flow control device.

22. The method of Claim 21, comprising slidably positioning the piston to operably divide the piston tube into a first working chamber and a second working chamber.

23. The method of Claim 21, comprising:

displaceably connecting a first one of each of the pair of bleed plates and the pair of blow-off discs on the first face; and

displaceably attaching a second one of each of the pair of bleed plates and the pair of blow-off discs on the second face.

24. The method of Claim 21, comprising:

preloading each of the pair of bleed plates to open at a first fluid pressure; and

preloading each of the pair of blow-off discs to open at a second fluid pressure higher than the first fluid pressure.

25. The method of Claim 21, comprising adjusting the opening pressure by one of adding and subtracting at least one spring disc plate to each flow control device.

26. The method of Claim 25, comprising adjusting the opening pressure by one of increasing and decreasing a thickness of the at least one spring disc plate.

27. The method of Claim 21, comprising increasing a flow area of successive ones of the fluid passages on each of the first and second faces in fluid contact with one of the flow control devices.